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FOREST PLANTING LEAFLET.

WHITE ASH (Fraxinus americana).

FORM AND SIZE.

In the forest the white ash is a tall, slender tree with a smooth bole, which is surmounted by a small open crown of stout upright branches. The bole is often free from branches for more than half its length. In the open the trunk usually divides a few feet above the ground into several main branches, which form a graceful rounded head, rather open and widest near the base. On the bottom lands of the lower Ohio Valley, where the best development is attained, the white ash occasionally reaches a height of 100 feet, though in general it is a tree of medium size, with an average height of from 70 to 80 feet and a diameter of from 2 to 3 feet. The roots penetrate deeply into loose soil, but where hindered by rocks or an impenetrable substratum they develop an extensive lateral system.

RANGE.

The natural distribution of the white ash is from Nova Scotia and Newfoundland to northern Florida, central Alabama, and Mississippi, and westward to Ontario, northern Minnesota, eastern Nebraska, Kansas, Indian Territory, and Texas (Trinity River).

It seldom occurs in large masses, but usually as single individuals or in groups among other hardwoods. The associate species include many of the common hardwoods, such as the maples, elms, basswood, birches, walnut, and oaks.

The range for economic planting is from the valley of the Wabash and Ohio rivers north and west through Indiana and Illinois to the

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region of the Great Lakes; westward through Iowa, southern Minnesota, and eastern South Dakota; southward through eastern Nebraska and Kansas into northern Oklahoma and Indian Territory. The white ash will undoubtedly prove a valuable tree for planting in the arid regions on irrigated lands now being opened for settlement.

HABITS AND GROWTH.

The white ash prefers rich moist soil. The bottom lands of river valleys in the mild climate of the west central portions of its range produce the finest trees. A plantation will do best in a protected valley, on sandy loam that is light and easily worked. The white ash will thrive, however, in less favorable or even in adverse localities. A porous subsoil is essential, and a water table at a depth of 10 or 12 feet is of decided advantage. For general planting in the semiarid region of the Middle West the white ash is not so hardy and should yield preference to the smaller green ash.

Mature trees can endure only a moderate amount of shade, while young seedlings will start in dense shade, but require considerable light for their perfect development.

The rate of growth is rapid when compared to that of most of the associated hardwoods, but varies materially according to conditions of moisture and situation. In the southern part of its range post timber may be grown in ten or fifteen years. In a drier climate, where conditions are not so favorable, from fifteen to twenty years are required for the average tree to attain post size. On dry prairies the trunk is not more than 5 or 6 inches in diameter at twenty-five years. Trees grown in a dense stand in the Farlington plantation in Kansas made an average annual height growth of 1.7 feet and a diameter accretion of one-fifth inch annually. This is very slow compared to the rate of growth of other trees under similar conditions.

White ash is attacked by a number of fungous parasites, which grow on the living leaves and do more or less injury. These parasites rarely appear in sufficient numbers to do very much harm to the tree affected. One specimen of fungus, which grows in the heartwood of the trunk and branches, changes the wood into a soft, pulpy, yellowish mass, unfit for lumber purposes. In regions where this disease is common the ash never grows to be a very large or very old tree. In park or shade trees the disease may be prevented by coating wounds with an antiseptic substance such as coal tar.

White ash is also subject to insect injury. In case insects appear in numbers sufficient to do serious harm specimens should be sent to the Bureau of Entomology, where the insect will be identified and measures suggested for its control. Large trees are often doty at the base and sometimes have big heart cracks.

ECONOMIC USES.

The wood of the white ash is of great economic value. Wood from second-growth trees is usually more tough and elastic than that of the large, slowly grown first growth. Its most valuable qualities are strength and elasticity, and these combined with its ability to take a good polish and to season without injury make it a timber of first rank for furniture, car, and vehicle construction, interior woodwork, agricultural implements, and tools.

It is fairly durable in contact with the soil and is used for post timber. Because of its rapid growth, comparative freedom from disease, and ease of propagation white ash is certain to remain a favorite tree for ornamental planting. Where it thrives it is preferred to any other species of ash, but in regions of drought and extreme temperatures green ash should be selected in preference to white ash.

METHODS OF PROPAGATION.

Propagation is by seed, produced abundantly about once in three to five years, though individual trees along streams or in favorable open situations fruit more frequently. Natural reproduction is not abundant. The one-winged fruit ripens in October. It may be sown as soon as gathered or preserved for spring planting by stratifying in damp sand. If stratified, the seed should be mixed with about 3 parts of sand to 1 of seed and placed in a box in a cool cellar. Hand picking, although slow, is the most reliable method of collecting the seed, which can be gathered easiest from the low, open-grown, and most productive trees. Since the seeds of the several species of ash are similar in appearance, samples should be sent to the Seed Laboratory of the Department of Agriculture, where they will be identified and tested free.

Broadcast sowing of ash seed on prepared or unprepared ground, or planting in hills where the trees are to stand, is uncertain and unsatisfactory; therefore nursery culture is advised. The nursery and seed beds may be prepared on any rich, well-worked soil, an old garden spot being an excellent place if the soil is not full of weed seeds. Planting may begin in the spring as soon as danger of frost is past. For convenience in weeding, it is recommended that the seed be sown in drills 8 to 12 inches apart for hand cultivation and 2 to 3 feet apart for a horse cultivator. Since the germination per cent is low, the seeds should be dropped so thickly that they will touch each other in the row. They should be covered about one-half inch deep and the soil rolled firmly or pressed down by a board. During germination moisture conditions should be kept uniform and irrigation or sprinkling resorted to in times of drought.

PLANTING.

The seedlings should attain a height of 6 to 12 inches the first season, and may be transplanted to the permanent site when 1 year old. The question of spacing depends on locality. For plantations in the Middle West a desirable spacing is 4 by 6 feet; in regions of more abundant rainfall the trees should be 6 feet apart each way.

The white ash is adapted to both pure and mixed planting. Species suitable for planting with this tree are black walnut, black cherry, hackberry, hardy catalpa, Scotch pine, and European larch.

CULTIVATION AND CARE.

Cultivation should be thorough and frequent enough to keep out weeds and grass. The plantation should be tilled for at least three years or until most of the ground is shaded. As soon as serious crowding begins, thinnings should be made so that the trees remaining may have ample space for development.

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